

Roll No.

78051

M. Sc. Chemistry 4th Sem.
Examination – May, 2014

INORGANIC SPECIAL - IV

Paper : CH-504 XIV

Time : Three hours]

[Maximum Marks : 80

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) How can you increase the stability of metal - alkyl compounds ? 2 × 8
- (b) What are polyhapto ligands ?
- (c) In metal - allyl complexes how the allyl → Mo bond is formed ?
- (d) What are Sandwich compounds ?
- (e) Distinguish between carbyne and alkylidyne Complexes.

- (f) What are Nucleophilic carbene ligands ? Explain with one example.
- (g) Explain ClF_3 is not a fluxional molecule.
- (h) Which is the active catalyst for homogeneous hydrogenation of alkene ? What is its geometry ?

SECTION - A

2. (a) Discuss general methods of preparation of transition metal alkyls and aryls. 12
- (b) Write short notes on : 4
- (i) Haptacity
- (ii) 18 - electron rule.

3. (a) Discuss the decomposition reactions of transition metal alkyls. How can these decomposition reactions be inhibited ? 8

- (b) Briefly explain the electron deficient and cluster organometallic compounds. 8

SECTION - B

4. (a) Write down methods of preparation, structure and bonding of Zeise's salt. 10

- (b) Starting from ferrocene, how will you prepare its : 6

- (i) Dicarboxylic derivative
- (ii) Monoacetyl derivative
- (iii) Diacetyl derivative
- (iv) Amine derivative
- (v) Nitro derivative
- (vi) Ethyl derivative

5. (a) What are metal - allyl complexes and how allyl group is attached to metal ? Explain the structure and bonding in η^3 -allyl complexes. 10
- (b) Discuss the reactivity of coordinated Alkynes with electrophiles and Nucleophiles. 6

SECTION - C

6. (a) Write down the methods of preparation of Electrophilic and Nucleophilic carbene complexes. 10
- (b) Discuss bonding in Schrock type carbene complexes. 6

7. (a) What are transition metal carbene complexes ? Explain bonding and important reactions of carbene complexes. 10

- (b) Write down the synthesis and synthetic applications of Tebbes reagent. In what aspects this reagent is superior to witting reagent. 6

SECTION - D

8. (a) Which one is better catalyst for hydroformylation $CO_2(CO)_8$ or $Rh(H)CO(PPh_3)_3$ and why ? Write the mechanism of reaction. 9
- (b) How the rate of fluxionality of a Stereochemical non - rigid molecule can be calculated by NMR Spectroscopy ? 7
9. (a) What is so unique about Ziegler - Natta Catalyst ? Discuss the mechanism of hydrogenation of alkene using the catalyst. 8
- (b) Write down the mechanism of aerial oxidation of propene in the presence of $PdCl_2$ and $CuCl_2$ in dil HCl . 8